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ABSTRACT

A systematic process for selecting computer-based instructional systems and incorporating them into school programs is presented in this guide. The 8-step process which is outlined includes: (1) specification of goals and objectives, (2) assessment of student needs, (3) review of the curriculum framework, (4) determination of computer applications, (5) review of software, (6) selection of the computer system, (7) management of staff development activities, and (8) development of a plan for management and evaluation. Appended to the text are guidelines on courseware selection, guidelines on computer system selection, a list of sources for software reviews, a guide to system implementation, a quick guide to the selection and implementation process as a whole, and a glossary of computer terminology. (JL)

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Foreword

Today our public schools are educating students who will live and work in the 21st century. Their lives will be affected in large part by the electronic devices which are rapidly becoming essential tools in our factories, offices, schools, and homes. Such devices are a part of the technology by which we deliver and manage an abundance of information.

We must understand and use the new technology so that these students will be as literate tomorrow as those among us today who read and write. For them, computers, cable television, videodiscs, and satellites will be as pervasive as the electric typewriter or the jet plane.

One way we can help students most effectively is to follow a systematic process in selecting technology for our uses in schooling. Such a process is promoted in this publication. We hope the steps herein prove helpful as you incorporate computer-based instructional systems into your school program.

Raymon L. Bynum
Commissioner of Education

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Introduction

With the prevalent growth of computer uses in our society it is essential that educators practice professional planning processes in their selection of computer systems which will be used in the instructional program.

A plan to integrate computers into the instructional program may be built around three purposes and categories of use.

The three purposes are:

(1) To help teachers teach and students learn.

(2) To make new topics of instruction possible and accessible to students.

(3) To expand the intellectual capabilities of students.

The three categories are:

(1) The computer as media. The computer is used to deliver instruction and instructional content. This is often called the tutorial use. Typically, this category includes CAI (Computer Assisted Instruction) such as computer games, simulations, drill and practice and elemental problem solving.

(2) The computer as an object of instruction and as a tool. This is often referred to as the tool use. It includes learning how computers work, how they are programmed, and what they can be used for. It involves their use as word processors, in information processing and retrieval, and for computer managed instruction.

(3) The computer as a new way to think, design, create, or solve. This is often referred to as tutee, or tool maker use. It means the computer is used to expand the intellectual capabilities of the user. It is a result of learning to use a tool so that its use affects one's views, ideas, thought processes, mental structuring, and approaches to problem solving.

It is prudent to plan carefully for the use of computers in instruction. It may be expected that the most apparent uses will be easiest to adopt, as for example using computers as media. This guide is thus reflective of the most prevalent computer uses in instruction, namely computer assisted instruction. Its bias is toward doing what we already do in delivery of instruction and toward courseware selection based on careful planning. However, this guide also allows for and promotes a process of selection of computers to realize their uses as tools and for expanding intellect. As our professional knowledge grows through experience, guides such as this will surely change to reflect that experience.

Guide for Selecting
A Computer-Based Instructional System

This guide has been developed to help school districts select computer-based instructional systems which meet defined needs. A computer-based instructional system (CBIS) includes hardware, software, documentation, facilities, inservice training, management, and evaluation procedures. A glossary of terms is on page 22. (A quick guide is included as Appendix E).

Step 1: Specify the Instructional Goals and Objectives

Instructional goals and objectives must be defined prior to considering any tool or strategy for instruction. A single set of learner objectives, scope and sequence, or skills continuum for each content area should be the guide for all instruction in that area. The computer is one tool which may be used to address these objectives.

DISTRICT ACTIONS:

Identify the instructional objectives and state those which will be addressed through use of a computer-based instructional system.

Step 2: Assess the Student Learning Needs

Student learning needs should be assessed in relation to the instructional objectives. Learning needs are defined as the difference between the desired learning outcomes for students and their current performance relative to those outcomes. There may be many measures or indicators of student performance, but these must reflect accomplishment of the defined objectives. On-going assessment procedures used by the district are appropriate for defining student needs, as well as other procedures which might measure particular objectives to a greater degree of specificity.

After completion of the needs assessment, the student population(s) will be identified. All other decisions regarding the selection of a computer-based instructional system should be made relative to the identified needs and the population experiencing those needs.

DISTRICT ACTIONS:

- **Identify the assessment tool(s) and the information used for local instructional improvement, including, as appropriate, Texas Assessment of Basic Skills data, criterion-referenced information, standardized achievement test scores, and other diagnostic and descriptive information.**

- **Identify the particular population to be addressed, including grade level and distinguishing characteristics of the students.**

Step 3: Review the District's Curriculum Framework and the Means Used to Implement That Framework

A basic framework for curriculum must exist before the appropriateness of using a computer-based instructional system can be judged. If computer literacy (including computer programming), the computer as an object of instruction, or the computer as a tool maker have been determined to be learning needs, a curriculum framework will probably not be in place and will need to be developed. All instructional materials and media should be correlated with this framework.

DISTRICT ACTIONS:

- **Review curriculum frameworks or develop them as necessary.**
- **Correlate textbooks and other instructional material in use with the framework. Explore how a computer-based system will correlate with and complement these materials.**

Step 4: Determine the Applications of the Computer

The computer has many uses or applications which are defined by the particular software or courseware selected. However, some computer-based instructional system applications will be more appropriate than others for addressing the previously identified student needs.

The term "computer-assisted instruction" (CAI) typically includes four applications: drill and practice, tutorial, simulation, and problem solving.

A computer-managed instruction (CMI) system may offer diagnosis, prescription, data collection, data reporting, and correlation of instructional materials to objectives.

Other applications such as the computer as an object of study or for expansion of the intellect might be more appropriate for the identified population. Such applications should be studied to determine which will be most effective.

DISTRICT ACTIONS:

- **Review alternative applications for the computer.**
- **Define the rationale for the application selected.**

Step 5: Review and Select Software

A range of CAI software or courseware may be available which will present information in a way to cause students to attain specified objectives.

If CMI is more appropriate, there are software packages available for correlating instructional materials by objective, diagnostic testing, placement and

record keeping. CMI software should not be confused with courseware; their content, structure, and purposes are different. Some courseware may have integral management programs.

Other programs are available to teach computer literacy, programming, data processing, word processing, and the use of the computer as a tool maker.

Appendix A contains general guidelines for software or courseware evaluation and selection. The selection of software requires knowledge about instructional objectives and computer capability. Examination of software for purpose, cosmetics, logic, sequencing, and pedagogic considerations are necessary. Familiarity with computer input and output devices (keyboards and video screens) and other computer capabilities (i.e., graphics and branching) is also necessary. There are many courseware selection guides and evaluations available to teachers (See Appendix C).

Reviewing computer software should be a team endeavor wherein the whole computer program is reviewed. It is a time-intensive activity and should be treated systematically.

DISTRICT ACTIONS:

- **Review courseware or other software under consideration using a comprehensive set of criteria or questions (see Appendix A) which address critical issues regarding courseware selection.**

- **Review evaluations of courseware available from organizations, journals, and other sources (see Appendix C).**

Step 6: Review and Select the Computer System

The computer system contains (1) the hardware, (2) the documentation, and (3) the set of software (computer programs) which cause the computer to operate and perform the functions desired. The computer itself is that part of the system which executes the directions contained in the software. Documentation is the set of written instructions which describes how to operate the hardware and software components. All three components of the computer system must be complementary.

The selection of a total system depends on the purpose for which it will be used both now and in the future. For this reason planning may include the use of other courseware, other kinds of applications (i.e., word processing, CMI, student accounting), other instructional purposes (computer programming) and other possible configurations (computer networks or additional components). These potential applications should be identified before making the final selection.

The user should select the hardware which best matches the courseware and is the most appropriate for the students. The earlier courseware selection will generally limit the selection of the computer system.

Specifications addressing the following areas should be reviewed:

- Instructional objectives and courseware selected.
- Description of the users of the system—student population, grade level(s), number of students, and teachers.
- Proposed instructional settings—regular classroom, learning resource center, laboratory, etc.
- Needs for hardware maintenance, software maintenance, and training.
- Potential growth and the system's capability for adding components such as printers, disks, memory, communications, etc.
- Requirement for software utilities such as languages, sort routines, computer-managed instruction programs.
- Requirements for potential uses of the system.
- Compatibility with other instructional materials or existing computer system.

Appendix B is a guide for selecting the system (hardware, documentation, and software). Although it is not comprehensive, the primary issues are included.

DISTRICT ACTIONS:

Review multiple hardware systems using Appendix B and the above specifications as a guide.

Step 7: Conduct Staff Development for Administrators, Teachers, and Other Instructional Staff

Prior to introducing the computer into the instructional setting, teachers and other staff should be adequately prepared to use the system, including courseware, documentation, and hardware. Teachers should exhibit the following general competencies:

- Understanding the instructional program objectives and how the computer-based system will enhance student achievement. Knowledge of how achievement will be evaluated.
- A working knowledge of computer terminology, especially that related to the hardware.

- Ability to identify and resolve problems students may encounter in using the computers.
- Understanding of any special software/courseware needed to initiate instruction.
- Understanding of the system's documentation.
- Awareness of capabilities such as test preparation, availability of student performance data, etc.
- Awareness of the limitations of the computer system.
- Proficiency in the use of the computer system.

DISTRICT ACTIONS:

- **Develop a staff development plan which addresses the above competencies.**
- **Establish a time line for implementing the computer-based instructional system.**

Step 8: Develop a Plan for Management and Evaluation

Management of the system must define the roles and responsibilities of the teachers, principals, and other instructional team members along with technical specialists necessary to the smooth working of the system. Instructional team members may include librarians (media or resource specialists) and subject matter or program specialists. The technical specialists may include computer programmers, maintenance personnel, etc.

As in any good management plan, the tasks necessary to reach the objectives are carefully defined. Communication links must be strong, continuous, and timely.

A management plan should:

- Identify the role of all staff using the computer-based instructional system.
- Identify support personnel (including maintenance staff) and their roles.
- Establish schedules for staff training.
- Establish schedules for use of computer if more than one class or staff person is to use it.
- Establish procedures for training students.

Information about the management process, the communication link, and any breakdown of communication may be generated in a timely fashion. It is this information which feeds the process of evaluation.

Most school districts have on-going systems for measuring student outcomes. Continuing use of the computer must be justified by its impact on students. Evaluation of student progress based upon measures external to the computer system should be conducted at least annually and perhaps more often.

The evaluation plan should also examine the courseware selection criteria and its continuing appropriateness, amount of time the computer is used, time-saving for teachers, the cost of the program and if additional peripherals are needed.

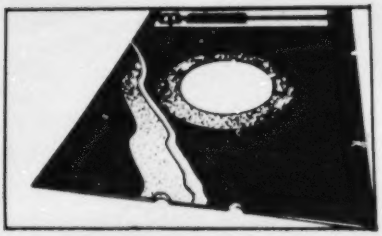
An evaluation plan will:

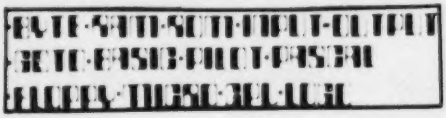
- Identify instruments to be used to evaluate student progress.
- Establish a time line for evaluation of student progress and testing.
- Determine procedures to evaluate the cost vs. benefit of a computer-based instructional system.
- Evaluate the courseware selection criteria initially used to determine if it is comprehensive and appropriate to the current knowledge level of users.

A variety of other implementation details such as budget, new job descriptions, and community awareness must be addressed with the advent of a computer-based instructional system. Appendix D introduces a few of these issues.

DISTRICT ACTIONS:

- **Develop a management and evaluation plan.**





Appendix A
Courseware Selection

1. Does the courseware match your predetermined instructional objectives?

2. Does the specific application (i.e., problem solving, drill and practice, tutorial) of the courseware have promise for meeting the identified student learning needs?

3. Does the courseware prescribe entry level skills?

4. What are the experiences of other users with the courseware?

5. Has the courseware been evaluated in terms of its effectiveness in improving learner outcomes?

6. Can the courseware be adapted to meet changes in the curriculum and in the way student needs might be more effectively addressed?

7. Does the vendor provide courseware updates and error correction?

8. Is the courseware pedagogically sound and is there a diversity of instructional approaches?

   - What is the reading level used in the courseware and is it appropriate for the intended student users?

   - For what length of time will the students use the courseware—in individual sessions—and how often?

   - What is the overall visual effect of the material?

   - Are the pictorial simulations used where appropriate?

   - Is the instructional material well designed?

   - Do the content strands contain a sequence of lessons ranging from easy to difficult?

   - Does the teacher manual and/or student manual complement the courseware?

- Is adequate documentation at the appropriate reading level provided with the courseware?
- Is on-line direction provided to the student while interacting with the computer?
- Are component steps in solving a problem provided to the student?

9. Is the courseware user-controlled?
   - Can there be random selection of couseware content?
   - Can the user branch to various parts of the lesson for help, glossary, etc. and get back again?
   - Are the next steps clear?
   - Does the user control the reading rate and pace?
   - Can the student decide to revise previous work during a session?
10. How is feedback to students provided?
   - Are explanations provided on why incorrect response was unacceptable?
   - Are incorrectly spelled answers accepted? Is the spelling error corrected in feedback to the student?
   - What happens when the student input is not recognizable by the computer?
   - Are wrong answers treated appropriately—not demeaningly?
11. Does the courseware provide for permanent management and scoring or is it lost when the machine is turned off?
12. Is the courseware easily and quickly loaded into the computer?
13. Are the name and address of the courseware developer/vendor provided if a user has questions, recommendations, or problems?
14. Will teacher training be required to use the courseware and who will provide the training?

15. Is the material actually on the market so it may be readily acquired, as opposed to being available only for demonstration or review?

16. Are "backup" software and courseware disks, cartridges or tapes provided at a reduced price?

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Appendix B

System Selection (Hardware, Documentation, and Software)

1. What software is provided with the system? What software can be added? What additional hardware is required for adding new software capability?

2. What peripheral components are required for the courseware selected? What peripheral component capacities and speeds are required to achieve objectives? For example, the time it takes to load programs into the computer memory from a tape cassette may annoy a user. Computer response time is a critical factor. Other hardware such as touch panels, special keyboards, printers, speech synthesizers are available. They may require special considerations about space, cumbersome cords and plug-in items, or change the RAM (Random Access Memory) available for actual computing functions.

3. Are components designed with the user in mind? Keyboards come in special and standard arrangements, may or may not contain upper and/or lower case letters and may contain special symbols. Video displays may be easy to view or have glare and other problems. Computers may be portable and durable or be designed to be more or less permanent.

4. How will software be improved or corrected (software maintenance)? Who is capable of and authorized to change the software?

5. Can the computer system support graphics? Are graphics appropriate for improving learner outcomes? Color, graphs, maps, lines, shapes, and simulations can be displayed with some computer systems. There are several factors which may have impact on graphic clarity and viewability, such as resolution in the cathode ray tube (i.e, "fuzzy" screen).

6. Is there a capability for storing or saving programs and data? Some storage is performed by transferring information from the computing unit to disks or tape cassettes. Such capabilities, including necessary peripherals, may require additional expenditures.

7. Is the computer memory capacity adequate? Is it expandable? RAM (Random Access Memory) is the usual designation for useful memory (expressed as 16K, 32K, etc). The ease and expense for increasing this memory capacity must be considered in terms of anticipated requirements. The same consideration should be given to disk storage capacity.

8. What computer languages can the system use? Not all computers use the same language or "dialects." BASIC or any other language may vary across several vendors and thus may not be compatible with different computers.

9. Has a cost comparison of components been made? Similarly capable and constructed parts of hardware such as disk drives, CRTs, microprocessor boards, cabinets and connectors may be compatible across manufacturers and can vary significantly in cost. Cost comparison of components or systems is advisable. Discounts are usually available through existing Education Service Center contracts or state contracts.

10. What is the availability and cost of hardware maintenance, service and backup? Warranties from a reliable manufacturer, the speed and cooperation with which repairs and services are to be performed, and the cost of each are among the most critical considerations. Different service contracts are options to be considered. Are extended warranty provisions available? Computer equipment has a reputation for high reliability, but down time, even if short, can be detrimental in the learning environment. Will extra hardware on-site or a complete system loan agreement be required to replace units being repaired? What is the experience of other users?

11. Are your facilities, power availability, and security arrangements adequate? Housing, placement and protection of computers, disk storage, etc., should be planned prior to their selection.

12. Is the system capable of communications with another computer system? If the system will be used for other purposes such as an input terminal to another computer, then communications features (hardware and software) will be required.

13. What training will be provided by the vendor? (The importance of training should be stressed in bid specifications.) What additional inservice training is planned?

14. Are all components such as cable and connectors necessary to operate the computer with all its peripherals included in the bid? Are delivery and on-site installation required? Are they included in the bid price?

Appendix C

Selected Sources of Courseware Reviews

This annotated list includes selected journals, indexes, and clearinghouses which review and evaluate instructional courseware on a regular basis. Sources included are those which were in print and available for examinations as of January, 1982. Catalogs and directories of courseware have been omitted, although indexes citing courseware reviews are included.

New sources of information about this field are increasingly available. Educators concerned with the selection of courseware should make every effort to be aware of and become familiar with them.

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   2. *Computing Teacher*
   3. *Creative Computing*
   4. *Educational Computer Magazine*
   5. *Electronic Classroom*
   6. *Electronic Education*
   7. *Electronic Learning*
   8. *Journal of Computers in Mathematics and Science Teaching*
   9. *Journal of Courseware Review*
   10. *Mathematics Teacher*

A. CLEARINGHOUSES

1. EPIE Institute
   P.O. Box 620
   Stony Brook, New York 11790 Subscription Basis

EPIE (Educational Products Information Exchange), in cooperation with the Microcomputer Software Resource Center at Columbia University Teachers College, publishes "in-depth curriculum analyses of those software packages that cover a significant portion of instruction . . . in reading, science, language arts, mathematics, and social studies. Also included will be critical reviews of curriculum materials on computer literacy." Courseware reviewed are the larger, more expensive commercially published programs.

The materials analysis instrument used for the evaluation process was developed especially for computerized instructional programs but is based on the instructional design analysis system that EPIE has been using for the last decade.

EPIE Report 98/99 (Fall/Winter, 1981) contains evaluations of microcomputer courseware and microprocessor games as well as a discussion of EPIE's evaluation criteria and a brief state of the art report. Each program evaluation includes rationale, learner goals, instructional strategies, contents, methodology, means of evaluation, instructional design congruence, use considerations, a summary, and recommendations.

2. MICROSIFT
   Northwest Regional Educational Laboratory
   710 S.W. Second Avenue
   Portland, Oregon 97204

A clearinghouse for microcomputing in education, MICROSIFT has as one of its objectives "to develop, validate and implement an evaluation model suitable for computer-based instructional packages . . . including support for the long-term assessment of the quality of materials proposed for distribution." Courseware for kindergarten through grade 12, is considered. Evaluators are chosen from a network of organizations set up by MICROSIFT. All details of dissemination have not yet been worked out, but results will be made available through a variety of print sources; two sources will be ERIC and the International Council on Computers in Education.

The first set of MICROSIFT field test reviews appears in *MICROSIFT NEWS*, v. 2 no. 1 (October, 1981) a quarterly newsletter which is available to interested persons without charge. Each review includes a program description, instructional objectives, instructional prerequisites, content and structure, potential uses, major strengths, major weaknesses, and an evaluation summary. Evaluators indicate whether they would or would not use the program.

3. The Software Exchange
   TERC (Technical Education Research Centers)
   8 Eliot Street
   Cambridge, Massachusetts 02138

   This microcomputer information service is in the planning stage at this time. Among the many services envisioned are the semi-annual publication of 50 in-depth reviews of educational software and the provision of an on-line electronic software database which would contain evaluations and purchasing information. These services and others such as technical reports, seminars, a current awareness service, and a newsletter would be available to users for a fee.

B. INDEXES

1. School Microware Reviews: Evaluations of Educational Software For Apple, PET, TRS-80
   Dresden Associates
   P.O. Box 246
   Dresden, Maine 04342 Semi-Annual $20.00/issue

   Reviews of pre-college instructional software available for the Apple, PET, and TRS-80, are grouped by subject; there are 50 in the first issue. Information includes title, subject, grade level, equipment requirements, producer, language, packaging, and price. A functional description section tells what the program consists of and what it does.

   The evaluation is presented in two parts. Characteristics, including documentation, instructions given to the computer by the program, student-computer dialog capability, user control, etc., are rated as complete, partial, or minimal. Essential characteristics are starred. A comments section consists of the reviewer's evaluation and noteworthy features. Signed reviews are by Dresden staff or by users

who contribute reviews using the evaluation form provided in each issue. A number rating from 1 to 10 is assigned to the program. This number is derived from ratings given by the reviewer to each item on the evaluation form.

A useful special feature of *School Microware Reviews* is an index by program title to courseware reviews in other current periodicals.

Future issues will include reviews of courseware for other microcomputers as well as those included in the first volume.

C. JOURNALS

1. *Classroom Computer News*
   P.O. Box 299
   Cambridge, Massachusetts 02138 Bi-monthly $9.00/year

Brief reviews note the type of program (CAI, CMI, drill and practice, etc.), title, source, price, subject, grade level, and comments on outstanding good or bad features. Aspects considered include descriptive information, ease of use, and pedagogical soundness.

2. *The Computing Teacher*
   Computing Center
   Eastern Oregon State College
   La Grande, Oregon 97850 9 issues/year $14.50/year

About three short reviews (ranging from 200 to 600 words) are included per issue, combining descriptive and evaluative information. Reviews are not based on classroom use. Most are written by Dan Isaacson, a recognized expert in the field who edits this department, although readers are encouraged to submit their own reviews.

3. *Creative Computing*
   P.O. Box 789-M
   Morristown, New Jersey 07960

Evaluations include long, in-depth, signed reviews with illustrations, and a discussion of strengths and weaknesses of the program. Each issue also contains short, descriptive reviews of selected courseware with summary evaluations.

4. *Educational Computer Magazine*
   P.O. Box 535
   Cupertino, California 95015 Bi-monthly $12.00/year

This journal plans reviews of software, books, and hardware. Reviews are solicited from users in education settings.

5. *The Electronic Classroom*
150 West Carob Street
Compton, California 90220 Monthly $37.50/year

Hardware, software, computer literacy courses and other selected media are evaluated for classroom applicability, realization of objectives, teacher preparation requirements, and budget considerations.

6. *Electronic Education*
Electronic Communications, Inc.
Suite 220, 1311 Executive Center Drive
Tallahassee, Florida 32301 Ten issues/year $10.00/year

Each issue contains a narrative review of a system or selected software. Reviews, which are signed and include reviewer's credentials, combine description and evaluation.

7. *Electronic Learning*
Scholastic, Inc.
P.O. Box 2580
Clinton, Iowa 52735 Bi-monthly $17.00/year

Each issue contains a "Computer Software Reviews" department with evaluations of approximately four programs. Information given for each program includes title, subject, necessary equipment, grade level, source, and cost. The signed reviews are a consensus of the views of three or four persons versed in computer science and/or the subject matter and grade level for which the courseware is intended. Reviews, approximately one column in length, contain detailed descriptions of the programs, including their special features and strong or weak points.

A department called "Teacher Approved" contains briefer (150 word) reviews by teachers of programs they have found successful in their classrooms.

8. *Journal of Computers in Mathematics and Science Teaching*
P.O. Box 4455
Austin, Texas 78765 Quarterly $7.00/year

Each issue includes reviews of software for mathematics and science teaching and announces new products for these teaching fields.

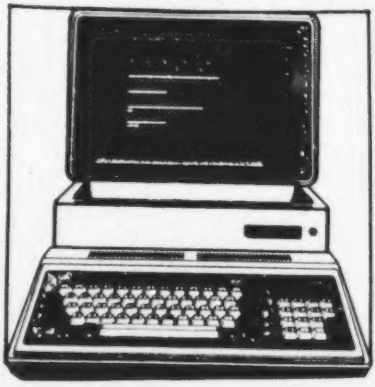
9. *Journal of Courseware Review*
P.O. Box 28426
San Jose, California 95159 $6.95

Published by the Foundation for the Advancement of Computer-Aided Education, signed, critical reviews of programs for the Apple II are included. Reviewers are recognized computing education authorities with direct experience in the content area. Volume I Number 1 contains 15 in-depth reviews of 3 to 5 pages. Reviews consist of a narrative description illustrated by examples of the program's visual display and a detailed narrative evaluation in terms of the program's stated goals and objectives.

A special feature is the inclusion of the Dewey Decimal Number, ERIC descriptors, and Sears subject headings for each program.

10. *Mathematics Teacher*
National Council of Teachers of Mathematics
1906 Association Drive
Reston, Virginia Nine issues/year $28/year (institutional rate)

Included in the "New Products' section of each issue are short, signed reviews by mathematics teachers evaluating mathematics courseware.



Appendix D
Implementation

1. What factors will influence the instructional setting(s) or location of equipment, such as the funding source, staff competency, student needs, number of students per device, security, etc.? What are other factors which may be affected by instructional setting decisions? For example, is the microcomputer appropriate? Should a simple network be used? How much equipment is needed? What additional wiring or power is required?

2. What is the need for training teachers, aides, administrators, parents, and students? For example, should teachers be capable of performing some elementary maintenance? Checklists of simple problems with previously successful remedy options may be helpful.

3. What consideration will be given to parent attitudes? Should they be made aware of how the school intends to make the computer available to students? What explanatory meetings and documents are needed for such community groups as the PTA, chamber of commerce, etc., to ensure understanding and support of the program.

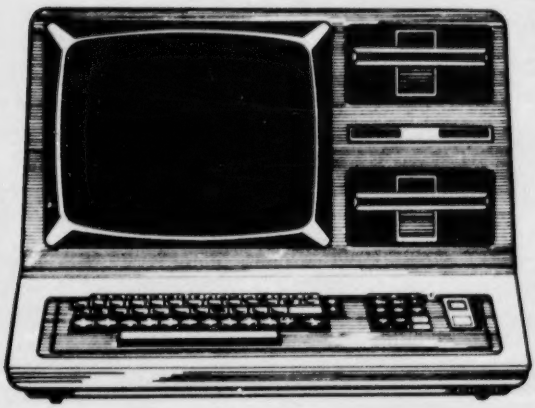
4. What new responsibilities must be assigned? Who will handle equipment trouble calls or complaints, schedule access to equipment, handle public relations, etc.?

5. What backup is critical for hardware, software, and courseware? Are additional complete devices going to be available to replace those not functioning? Can common, easily replaced parts be kept on hand for quick repair?

6. What are considerations for budgetary planning beyond acquisition of hardware and courseware? For example, do recurring costs for courseware, maintenance, supplies, and periodicals need to be considered? Will job descriptions and salaries have to reflect new functions to be performed? New budget and expenditure classifications for accounting will be necessary.

7. Are professional periodicals and other pertinent literature on data processing, computer science and computers in education made available to administrators, teachers and students? Where will you obtain training materials for administrators, teachers, students and community groups?

8. What documentation and reports will you require? For example, what documentation will be required to aid users in the operation of the hardware, software, (i.e., file maintenance, sort capabilities), and courseware?



·BYTE·RAM·ROM·INPUT·OUTPUT
GOTO· BASIC·PILOT·PASCAL
·LOGO ·MICRO·CPU·FLOPPY

Appendix E
The Quick Guide

1. Identify the instructional objectives which will be addressed through use of a computer-based instructional system

2. Identify the assessment tool(s) and the information used for local instructional improvement including, as appropriate, Texas Assessment of Basic Skills data, criterion-referenced information, standardized achievement test scores, and other diagnostic and descriptive information.

3. a. Review or develop curriculum frameworks as necessary.

   b. Correlate textbooks and other instructional materials in use with the framework and explore how a computer-based system will complement these materials.

4. a. Review alternative applications for the computer.

   b. Define the rationale for the application selected.

5. a. Review courseware or other software under consideration using a comprehensive set of criteria or questions (see Appendix A) which address critical issues regarding courseware selection.

   b. Review evaluations of courseware available from organizations, journals, and other sources (see Appendix C).

6. Review computer systems using Appendix B and the specifications on page 5 as a guide.

7. a. Develop a staff development plan which addresses the competencies identified.

   b. Establish a time line for the school district to implement the computer-based instructional system.

   c. Collect information about staff development, including cost, location, and the provider.

8. Develop a management and evaluation plan.

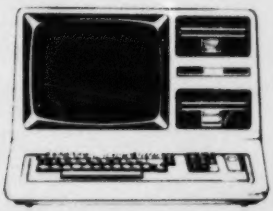
Glossary

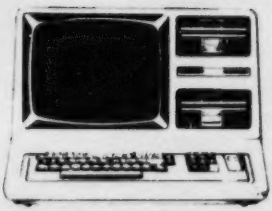
BASIC	Acronym for Beginner's All-Purpose Symbolic Instruction Code—a high level programming language that's particularly popular because of its relative simplicity.
Branching	A program instruction that causes the computer to discontinue the sequential operation of program instructions and move to another location in the program. Example: In CAI courseware the programmed response changes as appropriate for right and wrong answers.
Communications	Computer communications involve the transferring of the representation of data from one point or piece of equipment to another.
Compatibility	The ability of one device to accept and handle data that have been prepared or processed by another device without data conversion or computer program modification.
Computer	An electronic device that can accept data (numbers or words), act on the data in performing either arithmetic or logic operations, and produce a result or answer.
Computer Network	Two or more interconnected computers.
Computer System	The subset of the computer-based instructional system which includes the hardware, software, and documentation.
Courseware	A subset of software. Courseware is the instructional material. It may be linear in sequencing or allow branching, manipulations and the like. Courseware may come in a variety of formats including disk, cassette tape, and cartridges.
Data Processing	The systematic sequence of operations—mathematical, logical, or both—which a computer

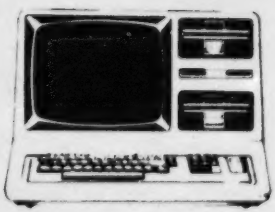
	performs on data in accordance with programmed instructions.
Disk (Disc)	A magnetic, nonvolatile, storage device on which data and computer instructions are stored.
Documentation	A comprehensive set of written materials which relate to the description, operation and maintenance of the computer system. Documentation also includes the written material which may supplement the courseware.
Drill and Practice	Designed to supplement regular instruction by providing a means by which concepts presented and developed in the classroom can be practiced and refined at the computer.
Game	A situation where students have to know certain facts, perform certain skills, or demonstrate mastery of certain concepts. Winning depends upon mastery of these cognitive skills.
Graphics	The application of methods for processing information for pictorial or printed representation on display devices.
Keyboard	A typewriter-like unit used for entering data or instructions into the computer.
Language	A defined set of characters and rules which are used to form symbols and words and the rules for combining them into meaningful communication, i.e., English, French, FORTRAN, BASIC, PASCAL. It includes vocabulary and syntax rules. A computer language is a programming procedure which provides the computer with coded instructions it understands and executes to achieve an intended result.
Memory	The capacity of a computer to store data and instructions subject to recall or the component of the computer in which such information is stored. See "Random Access Memory."

Problem Solving	The finding of solutions to novel problems that should be carefully distinguished from drill, such as the routine substitution of numerical values in mathematical expressions of the same type. It involves the combining of previously learned rules into a new higher-order rule which "solves" the problem generalizable to an entire class of situations embodying other problems of the same type.
Program	A set of sequential instructions which is designed to achieve a specific result and which a computer is capable of accepting. "Programming" is writing such a set of instructions.
Random Access Memory (RAM)	The component of the computer system in which information is stored subject to recall. It is memory with both read and write capability. Storage of information which can be accessed at random. The data and instructions stored in the RAM will be lost when the computer is turned off unless transferred to some external storage device (disk, cassette).
Simulation	The dynamic execution or manipulation of a model, or some object/situation, so that the student can interact with simulated reality.
Software	The computer programs (sets of instructions) which cause the computer to function. Software includes operating systems (control programs), computer languages (BASIC, FORTRAN, etc.), utility programs (i.e., sort routines, etc.), and application programs (i.e., courseware, student accounting, etc.). Software is packaged in different configurations such as plug-in boards, microprocessor cassettes, magnetic tape, magnetic disk, or written steps to be input via a keyboard or other means.
Sort Routine	A computer program that arranges data items into groups according to predefined rules.
Tutorial	A general descriptor for the type of computer program intended to stand alone as an instructional entity; teaches rules and concepts embodied in the sub-

	ject matter and may evaluate the student's comprehension.
Video Screen	A television type screen that displays the output of a computer. Also referred to as a monitor, CRT (cathode ray tube), or TV set.
Word Processing	The storage, manipulation, and processing of text.







COMPLIANCE STATEMENT

TITLE VI, CIVIL RIGHTS ACT OF 1964; THE MODIFIED COURT ORDER, CIVIL ACTION 5281, FEDERAL DISTRICT COURT, EASTERN DISTRICT OF TEXAS, TYLER DIVISION

Reviews of local education agencies pertaining to compliance with Title VI Civil Rights Act of 1964 and with specific requirements of the Modified Court Order, Civil Action No. 5281, Federal District Court, Eastern District of Texas, Tyler Division are conducted periodically by staff representatives of the Texas Education Agency. These reviews cover at least the following policies and practices:

(1) acceptance policies on student transfers from other school districts;

(2) operation of school bus routes or runs on a non-segregated basis;

(3) nondiscrimination in extracurricular activities and the use of school facilities;

(4) nondiscriminatory practices in the hiring, assigning, promoting, paying, demoting, reassigning, or dismissing of faculty and staff members who work with children;

(5) enrollment and assignment of students without discrimination on the basis of race, color, or national origin;

(6) nondiscriminatory practices relating to the use of a student's first language; and

(7) evidence of published procedures for hearing complaints and grievances.

In addition to conducting reviews, the Texas Education Agency staff representatives check complaints of discrimination made by a citizen or citizens residing in a school district where it is alleged discriminatory practices have occurred or are occurring.

Where a violation of Title VI of the Civil Rights Act is found, the findings are reported to the Office for Civil Rights, Department of Health, Education and Welfare.

If there is a direct violation of the Court Order in Civil Action No. 5281 that cannot be cleared through negotiation, the sanctions required by the Court Order are applied.

TITLE VII, CIVIL RIGHTS ACT OF 1964; EXECUTIVE ORDERS 11246 AND 11375; TITLE IX, 1973 EDUCATION AMENDMENTS; REHABILITATION ACT OF 1973 AS AMENDED; 1974 AMENDMENTS TO THE WAGE-HOUR LAW EXPANDING THE AGE DISCRIMINATION IN EMPLOYMENT ACT OF 1967; AND VIETNAM ERA VETERANS READJUSTMENT ASSISTANCE ACT OF 1972 AS AMENDED IN 1974.

It is the policy of the Texas Education Agency to comply fully with the nondiscrimination provisions of all federal and state laws and regulations by assuring that no person shall be excluded from consideration for recruitment, selection, appointment, training, promotion, retention, or any other personnel action, or be denied any benefits or participation in any programs or activities which it operates on the grounds of race, religion, color, national origin, sex, handicap, age, or veteran status (except where age, sex, or handicap constitute a bona fide occupational qualification necessary to proper and efficient administration). The Texas Education Agency makes positive efforts to employ and advance in employment all protected groups.